

## **ABSTRACT**

Various embodiments of the invention described herein reduce contact resistance to a silicon-containing material using a first refractory metal material overlying the silicon-containing material and a second refractory metal material overlying the first refractory metal material. Each refractory metal material is a conductive material containing a refractory metal and an impurity. The first refractory metal material is a metal-rich material, containing a level of its impurity at less than a stoichiometric level. The second refractory metal material has a lower affinity for the impurities than does the first refractory metal material. The second refractory metal material can thus serve as an impurity donor during an anneal or other exposure to heat. This net migration of the impurities to the first refractory metal material limits growth of a metal silicide interface between the first refractory metal material and the underlying silicon-containing material, thereby providing ohmic contact with attendant thermal tolerance.